BASED ON LATE-SERAL HABITAT CONNECTIVITY

STRACT

year Habitat Conservation Plan for the 90,546-acre
River Watershed (CRW) in western Washington requires
g as a restoration tool on a portion of the 71,000 acres of
eral forest to facilitate the creation of late-seral forest
eristics. I developed a technique for prioritizing the
n of thinning projects based on the connectivity of late-
rest habitat as it develops over the planning period.
, forested areas likely to ecologically benefit from
g were identified on a watershed landscape derived from
entory and airborne sensor (e.g., MASTER) data. Forest
was then simulated to the end of the planning period for
tive landscape scenarios based on thinning and not
g these targeted areas. Habitat connectivity was
ed on these alternative landscapes by simulating the
al of late-seral forest dependent wildlife species using
gram to Assist in Tracking Critical Habitat (PATCH).
rison of the relative successful dispersal activity
n landscapes indicated where thinning will provide the
t benefit to late-seral forest habitat connectivity.

. Target forest characteristics that would likely benefit ecologically from thinning.

Characteristics*	Target
sity	>200 trees/acre
closure	>70%
meter	5-21" dbh
e	30-90 years
s	III or IV
	<30%
n	<4,500' asl

tic with spatial data representation in CRW.

. Spatially locate forest stands with targeted forest characteristics.

5 acres of forested
e CRW that is targeted
ation, based on remotely sensed
ified with timber cruise information.

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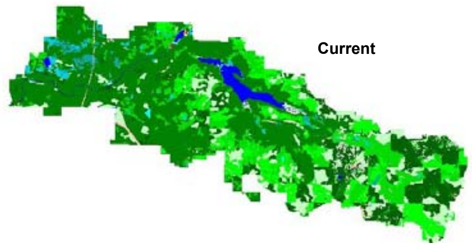
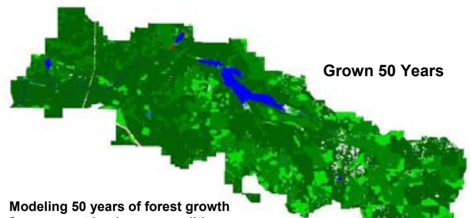
Seattle Watershed

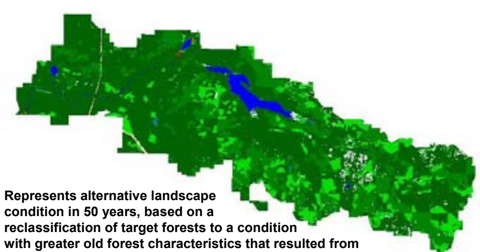
Step 3. Create "base landscape" by simulating forest growth over the planning period.





Modeling 50 years of forest growth from current landscape conditions. Darker green represents older forest.

Step 4. Create "alternative landscape(s)" based on potential effects of thinning in targeted stands.



Represents alternative landscape condition in 50 years, based on a reclassification of target forests to a condition with greater old forest characteristics that resulted from near-term thinning. Darker green represents older forest.

PLANNED REFINEMENTS

1) Alter targeted forest characteristics to better account for stands that would likely benefit from thinning.

2) Use better base habitat map (e.g., derived from 5-m MASTER) to improve classification accuracy and spatial resolution.

3) Incorporate adjacent lands to better account for migration across boundaries.

4) Utilize better simulation of forest growth (e.g., FVS) to improve estimates of future landscape conditions.

5) Parameterize PATCH using data from individual species to improve habitat connectivity for single species management. Or, conversely, utilize data that represents a suite of wildlife species to generally improve late-seral forest connectivity.

Step 5. Simulate dispersal of late-seral forest dependent wildlife species in both landscapes.

http://www.epa.gov/wed/pages/models/patch/patchmain.htm

The PATCH model simulates wildlife dispersal based on:

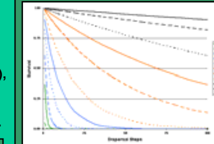
1) the distribution of habitats on a landscape (see previous forest maps),

2) the affinity of wildlife species for habitats,

3) home range size (smaller home ranges mean bigger potential populations),

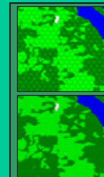
4) mortality during dispersal (⇧ mortality with ⇧ distance), and

5) dispersal turning probabilities (⇧ probability when in proximity to habitat).

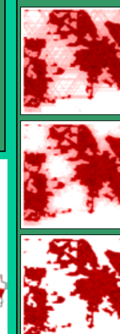


4) Dispersal
based on a sp
constant (alp
simulated by
exponential c
dispersal dis
increases.

2) The habitats delineated on the landscape maps are relatively weighted within PATCH based on the specified affinity of a targeted wildlife species. In this case, the habitat is weighted for an idealized late-seral forest dependent species.



3) Home ranges are simulated within PATCH as a matrix of hexagons. Species with smaller home ranges (e.g., the lower image at left) will have larger potential populations given equal habitat requirements. PATCH allows for varying home range sizes by "borrowing" suitable habitat from adjacent unoccupied home ranges, based on specified limitations.

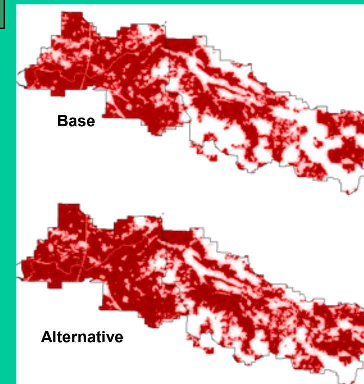


5) The probability of turning
dispersal is simulated within
specifying an appropriate bala
between randomness and the
of surrounding habitat. The u
image of successful dispersal
at left (the darker the red, the
activity) shows a population w
zero probability of turning one
out on a trajectory. The lower
shows such a high probability
turning that individuals of the
population are unable to leave
breeding habitat, even when t
no vacant suitable home rang
middle image strikes a balanc
between the two, allowing turn
probabilities that are influence
proximity of suitable habitat,
provide for dispersal through
optimal habitat.

MODEL PARAMETERIZATION

The PATCH model was parameterized based on a hypothetical wildlife species dependent on late-seral forest, and a population that would maximize the number of dispersers on a landscape:

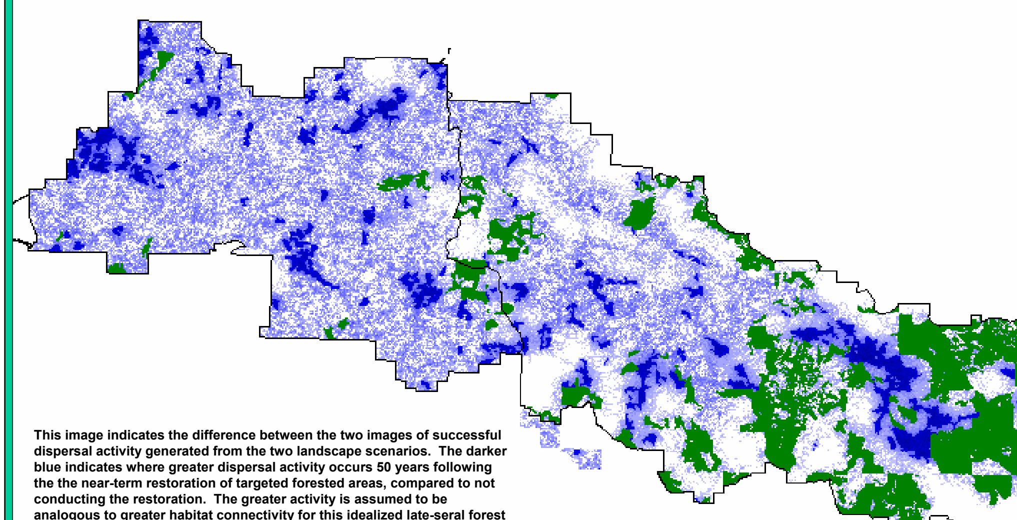
- Habitat distribution (input base and alternative landscape maps)
- Habitat utility weighting (see above)
- Home range size = 0.44 acres
- Maximum dispersal distance = 1.64 miles = 60 steps = dispersal alpha of 0.05
- Dispersal behavior (e.g., turning probability) = 25-0
- Initial population = 1/2 of available suitable home ranges = 51,525 base, 58,235 alternative
- # runs = 100



MODEL OUTPUT

The images at left, output from PATCH, indicate
of successful dispersal activity on landscapes w
without forest restoration (alternative and base,
respectively), grown 50 years, and under
specified model parameterization. The darker
red show greater activity.

Step 6. Compare spatially explicit dispersal activity between landscape alternatives to identify forest restoration areas that most benefit habitat connectivity.



This image indicates the difference between the two images of successful dispersal activity generated from the two landscape scenarios. The darker blue indicates where greater dispersal activity occurs 50 years following the the near-term restoration of targeted forested areas, compared to not conducting the restoration. The greater activity is assumed to be analogous to greater habitat connectivity for this idealized late-seral forest